

# Health aspects of water resources education and training

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*The health aspects of water resources development have been neglected hitherto. This article reviews some of the important constraints that have to be overcome before health considerations are properly integrated within the overall water management process. Some suggestions are made as to how best to improve the health knowledge of water professionals.*

Water is used for a variety of important purposes, among which are domestic requirements, irrigation, hydroelectric power generation, industrial manufacturing, transportation, waste disposal, recreation and wildlife enhancement. Water is a vitally important resource whose availability is often taken for granted until there is a scarcity or significant flooding.

With the increasing awareness of the importance of water to solve the food and energy crises of developing countries, much thought has been given in recent years to how to optimize the total benefits accruing from water development projects. In nearly all developing countries this resource has to be used more efficiently than at present if it is to provide potable water for rural and urban populations, to produce more food, to generate more electricity and to encourage other benefits to satisfy basic human needs to a much higher degree than at present. An essential prerequisite for such efficient water management is education and training, and there are other requirements for increasing efficiency such as institutional changes, an adequate budget and an appropriate legal framework.

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## Education and training

The Oxford Dictionary defines 'education' as 'systematic instruction' and 'training' as to 'teach and accustom to do, to action'. Thus the terms education and training are interrelated, and often it is not easy to make a clear-cut distinction as to where education ends and training begins or *vice versa*. The only distinction that will be made in the present article is that training is considered to be more specifically work-related than education. It should also be noted that all discussions that follow refer to education and training of people in developing countries, and unless specifically mentioned they refer only to health aspects of water resources. This does not mean that health is the only important aspect that needs to be discussed but only that it is the main emphasis of this article.

In the area of water resources, in common with many other areas, education and training should be considered for three levels for people:

- (i) professional – generally working for or holding a university degree in an appropriate subject;
- (ii) technician – working for or having a diploma from a technical school, usually on the basis of two to four years of attendance; and
- (iii) vocational – working for or having completed a primary school education, followed by up to two years of a certificate course or training by a government-sponsored course.

There is no question that all three levels of people are essential for efficient water resources management, and thus education and training programmes are necessary for all three categories. Equally necessary are such programmes in all the three areas simultaneously: it would be folly to concentrate on one at the cost of others.

For international organizations with limited budgets and equally limited manpower, any serious attempt to provide education and training at all the three levels simultaneously would most likely result in a programme that would be highly diffused and unlikely to have any discernible impact. Accordingly, it is felt that such organizations could achieve more in the education and training of professionals than the other two categories. Furthermore, the education and training programmes for professionals are likely to be more homogenous for most developing countries, when compared to those for technicians and vocationals, which may have to be designed on a national or even sub-national basis and also must be tailored more to local requirements, customs and languages. Consistent with this decision, the focus of the present article is on the health and training of professionals in water resources management.

### **Some facts**

While no objective person would argue with the importance of health education and training to optimize the total benefits stemming from any water development project, it should be clearly noted that it is not going to be an easy task for a variety of reasons. Frequently the constraints are not clearly recognized, and accordingly the overall impact of education and training programmes on water resources professionals has been spotty and often marginal at best. Among these constraints – real or perceived – are the following.

#### *Professional bias*

A review of the type of professional staff engaged in water resources management in developing countries clearly shows that the profession is overwhelmingly dominated by civil engineers. The situation is not much different in developed countries, except that one can identify a few more geologists, geographers, economists and other types of engineers. One would indeed be hard pressed to find health specialists, sociologists, lawyers, mathematicians and political scientists in most water departments in any country. If they exist they can be counted on one's fingers.

Even though much lip-service is given at present to the need for a multidisciplinary approach to

integrated water planning and management, by national, bilateral and multilateral agencies, what exist on the ground are primarily engineering-oriented and engineer-dominated institutions, which mostly believe that they can perform the tasks entrusted to them satisfactorily without much assistance from other disciplines. There are some indications that this type of thinking is changing, but the changes – wherever they can be seen – are often rather slow and may not necessarily be permanent. Whether one likes this trend or not, it is a fact that has to be recognized.

#### *Sectoral approach*

All governments, in order to have departments that are manageable, look at issues sectorally. To a great extent this sectoral approach has led to the dominance of engineers in the Ministries of Irrigation or Water Resources who are responsible for water development projects, except community water supply or sanitation projects, which are mostly the concern of Ministries of Health or Public Works. Equally the Ministry of Health is theoretically responsible for all health issues associated with water projects, including health education. In addition, the Ministry of Agriculture could be concerned with drainage, the Ministry of Energy with hydroelectric power, the Ministry of Transport with navigation, the Ministry of Fisheries with aquaculture, and the Ministry of Environment with environmental implications, which invariably overlaps with health.

Such sectoral approaches mean that, just as a Ministry of Irrigation is dominated by engineers, a Health Ministry is similarly in the domain of medical specialists. Cross-fertilization between the two ministries and two dominating disciplines seldom occurs. The problem is often compounded by years or even decades of rivalry over budget and empire-building. It is not unusual to find ministries which are reluctant to share with one another any data that are available and analyses that have been carried out, even though these are essential for the water management process for both.

Even in those few cases where enlightened water ministries have attempted to hire a few medical professionals the results have not been very encouraging. Recruitment of adequately qualified and experienced medical professionals has been a difficult task under the best of circumstances. After recruitment, the competent staff members tend to leave after a short period because of the lack of a career structure for health professionals in the engineering-dominated ministries. An analogous situation faces engineers in health ministries.

### *Health education and training for water engineers*

Because of the existing situation, which clearly requires improvement, it has often been suggested that engineers could perhaps be educated and trained in the area of health. While this idea has some merit, it should be examined in its total perspective.

Since water development projects have many implications, engineers are now being asked by various groups and disciplines to be trained in many new fields in addition to developing their own expertise. Thus, economists want them to know more about cost-benefit and cost-recovery approaches, sociologists would like them to be trained in public participation processes, environmentalists in environmental issues, management specialists in management skills, computer technologists and systems analysts want them to know more about these areas and health professionals would like to see more emphasis on health issues. While individually it is easy to make a case for the necessity of any of these areas of expertise, the fact remains that the time available for educating engineers has not grown. The educational process of engineers, in terms of time availability, has always been tight. Clearly it cannot be expanded to take care of all the requirements mentioned earlier. Furthermore, it is impossible for an engineer to master all these 'new' areas.

The best that can be achieved is to make an attempt to sensitize engineers in some select areas so that they will know when there is a problem, and when a specialist in that field needs to be called. However, for a specialist to be effective, he or she must also be sensitive to engineering issues as well. This is an area that needs immediate attention. While there is much talk and even some hand wringing about 'training' engineers in health issues, the health experts seldom mention their own training in engineering issues or even show a basic understanding of them. Without such mutual sensitization and awareness of each other's problems and constraints, the symbiosis or synergy within any process is likely to be limited.

### *Appropriateness of training programmes*

Developing appropriate training programmes is a difficult process. This can only be done if there are regular and constructive evaluations of such programmes, which are then modified as necessary. Unfortunately objective evaluations are somewhat rare, although there are numerous pseudo-evaluations. This is because often there is built-in institutional inertia, and sometimes even opposition, before an objective evaluation can be undertaken.

Currently too many pseudo-evaluations are being carried out, at national level as well as by multilateral and bilateral agencies, which are mostly concerned with the protection or enhancement of the reputations of the individuals concerned with the programmes and organizations associated with them than with determining the real effectiveness of the programmes. One would indeed be hard pressed to find a single training programme that was discontinued because it was considered to be marginal or ineffective. Rather, pseudo-evaluations find most programmes to be 'good' and in need of only minor modifications.

### **Some suggestions for improvement**

What can be realistically achieved in terms of improving the health knowledge of water professionals? First, it should be clearly understood that it would be a long and arduous task to improve the situation to any significant extent in most developing countries. Second, there is no single 'best' solution: rather a series of potential solutions should be considered. These solutions, discussed below, are not necessarily mutually exclusive.

#### *Identify forward-looking institutions*

It would be desirable to identify forward-looking educational institutions in developing countries which could be persuaded to organize courses on health aspects of water development at both undergraduate and graduate levels. If necessary, these courses could be run initially on a pilot basis. The institutions selected should ideally be among the acknowledged leaders in engineering education in their respective countries. If a course succeeds, the probability of other institutions following the 'leader' is likely to be high. Possible candidates for such institutions could include the Indian Institute of Technology or the University of Roorkee in India, the Asian Institute of Technology, Bangkok, the University of Cairo and Ain-Shams University in Egypt, and the University of Zimbabwe in Harare.

Once an institution has been identified, and it is willing to organize such a course, it may be necessary, at least initially, to arrange a lecturer with assistance from bilateral or multilateral aid agencies. Alternatively some lecturers from these institutions could be specifically trained at other places such as CEFIGRE in Sophia Antipolis, France, or at their regional office in Bangkok, Thailand. Whatever the solution, the training programme has to be carefully tailored to the needs of the engineering profession. Realistically the maximum time one can expect is one course over one term. The emphasis should be

on practical aspects rather than on purely theoretical issues.

The organizer of such courses should not attempt to provide water engineers with sufficient knowledge to make them health experts. It is simply impossible to do so in the time available. The objective should be to provide them with enough knowledge so that they are aware of the health implications of water management and development projects they may undertake, and know when to ask questions of the medical experts and what these questions could be.

It is seldom that a water specialist initiates a discussion with a health expert to identify and review the potential problems of water-borne diseases prior to the implementation of any engineering project. This is primarily because he or she is not aware of what is being done in villages by health professionals nor what knowledge and experience on health may already be available. Thus the course should not be tailored only to enable an engineer to answer various health-related questions personally, but rather to give him or her the necessary knowledge which would make it possible to ask the right questions of health experts and thus make better use of the expertise of those working in the health field.

#### *Availability of teaching materials*

The common error made by most international agencies is to assume that if they produce teaching materials these are likely to be used. We are not aware of *any* teaching material that has been produced by *any* multilateral agency that has actually been used even for *one* term in *any* developing country in *any* engineering undergraduate course.

In some developing countries, reputed standard texts prepared for use in developed countries are being used as they are because lecturers in universities and other institutes studied the subject abroad with the same texts. Naturally, these texts make practically no mention of health aspects of water resources development activities, and these subjects, though important in the developing world, are left untouched.

The optimal solution is likely to be to identify the main undergraduate texts on irrigation in a major developing country such as India, and to see if the author can be persuaded to add one (or two) chapters on the environment and health issues. The texts used in India are all indigenous, and the probability of success is likely to be higher if health is viewed as one of the environmental factors to be considered.

The other possibility is to see whether health issues can be realistically integrated in new text-

books that are currently being prepared. For example, the manual on sustainable water development that is now being prepared by CEFIGRE or the text on lake management by the International Lake Environment Committee (ILEC) are likely to have impacts in terms of training in developing countries. Both these texts are expected to be finalized by early 1990 or so. There is still time to influence these texts, but this will *not* happen by just writing to CEFIGRE and ILEC and asking them to include health aspects. Funds have to be provided to these institutions so that the teams working on the texts can expand their work. Without additional funding, the impact is likely to be minimal.

These training materials will later be used in field tests or training courses to be organized by CEFIGRE. Revisions to the manuals will be made thereafter based on comments and recommendations submitted by lecturers as well as trainees. Health professionals should actively participate in the last part of these courses to find out if the trainees have acquired sufficient knowledge of the health aspects to be able to conduct a meaningful conversation. They can also point out the shortcomings of the manuals from the viewpoint of the health specialists and recommend modifications. This sort of refinement is indispensable to make the training material really useful and applicable in developing countries.

#### *Identify good training courses*

Currently several courses on water development exist in developed and developing countries for the training of water professionals from developing countries. None of these training courses now deals with health issues to any significant extent. One possibility is to consider some of the best-respected courses such as the one at the University of Lund, Sweden, or at various locations run by CEFIGRE, and then provide lecturers to deal with health issues. Again this will require additional funding and identification of good lecturers.

The course at Lund is unique in the sense that it is rigorously evaluated by senior or middle-level water professionals who attend it each year. Unless the lecturer selected knows about water and health, and deals with practical rather than theoretical issues, he is highly unlikely to be invited back next year. Thus, the availability of funds and good lecturers are both important.

The process of carefully selecting lecturers at Lund has led to successful courses, which are the best of their type anywhere in the world. It is the experience of the United Nations Environment Programme that *ad hoc* training courses are general-

ly less effective than they are expected to be. This partly stems from the fact that those who are responsible for teaching have little training as lecturers. The common mistake is that a lecturer relies on his or her own experience or discipline rather than on an analysis of the real needs of trainees. The Lund system provides invited lecturers with opportunities for self-training over years to make themselves good lecturers. There is therefore a need to provide training for lecturers as well.

### *Selection of trainees*

The selection of trainees is also important. Any international organization receives numerous letters in which people in the developing world ask for fellowships to participate in training courses to enhance their knowledge. An analysis of letters of this kind indicates that practically all of the requests are for courses to be organized in developed countries. Few letters request assistance to participate in courses to be held in one of the developing nations of the continent in which the sender lives. Clearly, training courses in the developed countries tend to be regarded more as opportunities for sightseeing rather than for the enhancement of knowledge!

The nomination of trainees by governments may not result in the selection of sufficiently motivated candidates. One possible alternative could be to seek nominations from well-reputed organizations in target countries and experts who have worked in these countries for years and know well-motivated engineers.

Ways of providing water engineers with the motivation to learn health aspects should be found by their organizations. If the training offered does not relate to the expertise that the trainees need to acquire, few will have an incentive to participate in a course. Organizations must develop a mechanism for making use of the knowledge trainees will acquire before sending them on courses. In the same context, every effort should be made by the organizers of courses to provide their students with as much practical expertise as possible.

### *Interprofessional collaboration*

Currently there is very little collaboration between water and medical professionals. For example, at the World Water Congress of the International Water Resources Association, held in Ottawa in June 1988, there were more than 700 water specialists from some 68 countries. Bilateral and multilateral agencies provided around \$600 000 to bring over 160 participants from various developing countries. In addition to engineers, the congress was attended by

geographers, geologists, lawyers, economists, sociologists, administrators and political scientists. However, not a *single* medical specialist was present at this important congress, which is held only once in every three years. Similarly for the tenth anniversary of the UN Water Conference, convened in New York in January 1987, the health aspect of water was conspicuous by its absence. If health issues are to be taken seriously by water specialists, it is essential that health professionals make a point of participating in such important gatherings and sensitizing water experts. Preaching only to the converted will have a very limited impact. Equally health experts must understand the fundamental aspects of water resources development, and make a determined attempt to communicate with engineers in a way that can be easily understood. Not only should engineers make an attempt to understand the mentality of health professionals but equally health experts should try to understand the attitudes of engineers. Without sincere attempts by both disciplines, it is unlikely that the situation will improve perceptibly in the future.

## **Conclusions**

Health aspects of water development and management have been neglected hitherto. While there is no doubt that water developments have significant positive and negative impacts on human and animal health, water professionals have not generally been aware of the importance of health, except in an anecdotal fashion. Equally, health experts have basically stayed within their discipline and have failed to communicate with water professionals. While there are a few signs that interdisciplinary communication is better now than it was a decade ago, it has to be admitted that it is still very poor.

While there is an urgent need to sensitize water experts to the importance of health, this cannot be done overnight. Nor can it be done without understanding the mind set of engineers. Thus, if health implications are to be properly integrated into the water management process, the education and training of engineers need to be carefully planned.

## **Suggested reading**

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